55-2925-240-40

TM 55-2925-240-40

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

GS MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

DC STARTER-GENERATOR
PART NO. 23064-001

(LEAR SIEGLER)

Headquarters, Department of the Army, Washington, D. C.
6 April 1970

WARNING

PRECAUTIONARY DATA

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, death, or an aborted mission.

CLEANING SOLVENT. Cleaning solvent may be toxic. Use in well-ventilated area. Avoid prolonged inhalation or contact with skin. Do not use solvent near open flame or in area where very high temperatures prevail.

COMPRESSED AIR. Do not direct compressed air in close proximity to or directly against skin.

This copy is a reprint which includes current pages from Change 1.

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CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *15 March 1971*

GS Maintenance Manual
Including Repair Parts and Special Tools List

DC STARTER-GENERATOR

PART NO. 23064-001

(LEAR SIEGLER)

TM 55-2925-240-40, 6 April 1970, is changed as follows:

Page 2-1, table 2-3. Change item 6, Government Specification column "P-P-101" to read "P-P-121 CL1."

Page 3-4, paragraph 3-5a(5). Change second sentence to read, "Replace armature that necessitates turning of commutator to less than a minimum diameter of 2.830 inches."

Paragraph 3-5c. In line 3, change "sandpaper" to read "paper, abrasive."

Page 3-6, paragraphs 3-5g(2), (3), and (4). Wherever the word "sandpaper" appears, change to read "paper, abrasive."

Page 3-7. Paragraph 3-9*f* is superseded as follows:

f. Install dampener back plate (15) on armature (19) and press back plate into position until wear face is flush with end of armature shaft housing.

Paragraph 3-9*g* is superseded as follows:

g. Install clutch plate (14) over small end of drive shaft (13) and press the clutch plate onto the drive shaft spline only far enough for a firm meshing of the spline. Further adjustment of the clutch plate is covered in *i* below.

Paragraph 3-9*i* is superseded as follows:

i. Install fan (11) and inner locknut (12). Hold shaft (13) with wrench (QB80059-3, table 2-2). While tightening locknut, observe the position of the clutch dampener (14). The clutch dampener should retain a concave with recessed side toward back plate (15), of approximately 1/8 inch when inner locknut is tightened to a torque of 180 to 200 inch-pounds. If the clutch dampener shows signs of oil canning or becoming flat, remove the drive shaft from the armature and press the clutch dampener just far enough onto the drive shaft to obtain the proper concave, and repeat this step. If concave is excessive, it may be necessary to replace clutch dampener and repeat this step. Recheck torque of inner locknut (12) to 180-200 inch-pounds. Install outer locknut (12) and torque to 125-150 inch-pounds while holding shaft (13) from rotating with wrench (QB80059-3, table 2-2).

Page B-5. Change "FSN 5350-224-7205" under Maintenance Supplies to read "FSN 5350-271-7930," and "Paper, Abrasive, FED P-P-101" to read "Paper, Abrasive, FED P-P-121 CL1."

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 (qty rqr blocks no. 35, 354, and 39, cumulative for all blocks) requirements for Direct and General Support Maintenance Instructions for UH-1C, UH-1D and 1H, and AH-1G Aircraft.

SECTION I
INTRODUCTION

1-1. GENERAL INFORMATION.

a. This technical manual comprises overhaul instructions for the Model 23064-001 DC Starter-Generator (see figure 1-1), manufactured by the Power Equipment Division of Lear Siegler, Inc. (FMC31435) Cleveland, Ohio 44101. Sections I through IV of this technical manual contain instructions for this DC Starter-Generator. Overhaul instructions for additional models will be provided in Section V by the use of Difference Data Sheets.

b. Report of errors, omissions and recommendations for improving this publication is encouraged. Use DA Form 2028 (Recommended Changes to DA Publications) and forward it directly to the Commanding General, U.S. Army Aviation Systems Command, ATTN: AMSAV-R-M, P. O. Box 209, St. Louis, Missouri 63166.

Figure 1-1. Identifying View of 23064-001 DC Starter-Generator.

1-2. PURPOSE.

The purpose of the DC Starter-Generator is to provide torque for engine starting and to generate DC electrical power.

1-3. EQUIPMENT RECORDS.

The Army equipment record system and procedures established in TM 38-750 apply to this equipment. The applicable forms as required by TM 38-750 shall be used.

1-4. DESCRIPTION AND LEADING PARTICULARS.

The DC Starter-Generator is a self-excited machine incorporating four main poles and four interpoles. An integral fan at the antidrive end of the machine draws in air to permit self-cooled operation at all rated conditions. The leading particulars are as follows:

Rating (kw)	9
Continuous load within speed range (amp)	300
Voltage (gen. output)	30
Speed range (rpm)	4,400 to 8,000
Direction of rotation when viewing shaft end	CCW
Operating altitude (max. - ft.)	300 Amps - 15,000 ft.
	200 Amps - 25,000 ft.
Cooling	Self-Cooled
Weight (lb.)	47.5
Overhung moment (in. - lb.)	225
Mounting pad	AND 10262 Type XII-A
Distance between mounting-hole centers (inches)	5
Number of mounting holes	6
Mounting-hole type	Keyhole Slot
Number of teeth in drive spline	16
Drive spline pitch diameter (inches)	0.800
Positive terminal designation	B+
Negative terminal designation	E-
Positive field-terminal designation	A+
Equalizer terminal designation	D
Starting terminal designation	C+
Voltage (starter, max.)	30

1-5. PAINTING REQUIREMENTS.

Not applicable.

1-6. PRESERVATION AND PACKAGING.

The instructions contained in Figure 1-2 will govern preservation, packaging, packing and marking of the starter-generator after overhaul.

PRESERVATION, PACKAGING, PACKING AND MARKING REQUIREMENTS

NOMENCLATURE	STOCK NUMBER	
Starter Gen.	2925-927-9483	
	PART NUMBER	
	23064-001	
NET WEIGHT / DIMENSIONS	GROSS WEIGHT	CUBIC FEET

All specifications and standards applicable to the requirements herein shall be the issue in effect on date of invitation for bids.

PACKAGING

☒ LEVEL A ☐ LEVEL C

☒ PACKAGING SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-P-116, THE FOLLOWING DETAILED REQUIREMENTS SHALL APPLY:

UNIT PKG QTY	METHOD	PRESERVATIVE	WRAP	DUNNAGE	CONTAINER
1	IId	----------	MIL-B-121 Grade A or Polyethylene	MIL-C-7769 or MIL-P-26514	See Packing

PACKING

☒ LEVEL A ☐ LEVEL C

☒ ITEMS SHALL BE PACKED IN CONTAINERS CONFORMING TO SPECIFICATION NO. MIL-D-6054

PLYWOOD USED SHALL BE STANDARD GRADE WITH EXTERIOR GLUE OF U.S. PRODUCT STANDARD PS1-66. THIS PLYWOOD SHALL HAVE THE GRADE STAMP OF AN APPROVED TESTING AGENCY. FURTHER, PLYWOOD SHALL BE SURFACE TREATED IN ACCORDANCE WITH SPECIFICATION TT-W-572. WOOD QUARTED PLYWOOD CONTAINERS SHALL BE CONSTRUCTED WITH THE TOP INVERTED SO AS TO PROVIDE A FLUSH TOP SURFACE FOR WATER RUNOFF.

☐ ITEMS SHALL BE PACKED IN A MANNER TO INSURE CARRIER ACCEPTANCE AND SAFE DELIVERY AT DESTINATION. CONTAINERS SHALL BE IN ACCORDANCE WITH UNIFORM FREIGHT CLASSIFICATION RULES OR REGULATIONS OF OTHER CARRIERS APPLICABLE TO THE MODE OF TRANSPORTATION.

MARKING

☒ a. IN ADDITION TO ANY SPECIAL MARKING REQUIRED BY THE CONTRACT OR ORDER, SHIPMENT SHALL BE MARKED IN ACCORDANCE WITH STANDARD MIL-STD 129D, WITH CHANGE NOTICE 1 THRU 9, "MARKING FOR SHIPMENT AND STORAGE," DATED 28 DECEMBER 1964 THE SERIAL NUMBER AND THE CONTROL NUMBER OF DA FORM 2410 SHALL BE MARKED ON THE UNIT CONTAINER

☒ b. ADDITIONAL MARKING REQUIREMENTS. EACH INTERIOR PACKAGE SHALL BE MARKED ON AT LEAST TWO (2) SIDES WITH A SILHOUETTE OF THE AIRCRAFT. (WHERE THE SIZE OF THE UNIT CONTAINER IS TOO SMALL TO PERMIT THE APPLICATION OF TWO (2) LABELS, A SINGLE LABEL SHALL BE APPLIED. IF THE PACKAGE IS TOO SMALL FOR ONE (1), NONE WILL BE REQUIRED.) WHEN THE UNIT CONTAINER IS THE SHIPPING CONTAINER AND THE ITEM IS PACKED "LEVEL A", EACH CONTAINER SHALL BE MARKED ON TWO (2) SIDES, TOP AND ONE (1) END WITH A SILHOUETTE OF THE AIRCRAFT. THE SIZE OF THE SILHOUETTE MAY VARY, BUT WILL BE LARGE ENOUGH TO FACILITATE EASY VISUAL IDENTIFICATION WITHOUT OBSCURING OTHER MARKINGS. THE CONTRACTING OFFICER WILL SUPPLY LABELS ON REQUEST. THE NOMENCLATURE OF THE MAJOR COMPONENTS SHALL BE EXTENDED TO INDICATE THE END ITEM APPLICATION AND THE POSITION OF THE PART: e.g., GEAR BOX, MAIN FOR (APPLICABLE AIRCRAFT); WING ASSEMBLY, RIGHT, FOR (APPLICABLE AIRCRAFT).

☒ c. MATERIEL CONDITION MARKING SHALL BE APPLIED IN ACCORDANCE WITH PARAGRAPH 5.5.17 OF MIL-STD-129. A MATERIEL CONDITION TAG OF THE APPLICABLE TYPE WILL BE SECURELY ATTACHED DIRECTLY TO ALL UNINSTALLED OR STORED AERONAUTICAL OR AIR DELIVERY ITEMS. WHEN SUCH ITEMS ARE PLACED OR STORED IN CARTONS, PACKAGES, CRATES OR METAL SHIPPING CONTAINERS, A DUPLICATE MATERIEL CONDITION TAG OR LABEL WILL BE SECURELY ATTACHED TO THE EXTERIOR OF THE PACKAGE OR CONTAINER IN SUCH A MANNER THAT WILL AFFORD MAXIMUM PROTECTION FROM HANDLING AND WEATHER. TAGS WILL BE COMPLETED EITHER BY TYPEWRITTEN OR PRINTED BLACK LEAD PENCIL ENTRIES. ITEMS OF A COMMON OR NONTECHNICAL NATURE (i.e., COMMON HARDWARE, BULK MATERIALS, ETC.) THE SERVICEABILITY OF WHICH IS OBVIOUS, AND THE IDENTITY AND INSPECTION REQUIREMENTS ADEQUATELY INDICATED BY COMMERCIAL TAGS, LABELS OR MARKINGS, MAY BE RECEIVED, STORED, ISSUED OR SHIPPED WITHOUT MATERIEL CONDITION TAGS.

APPROVED BY	ORGANIZATION	DATE
E. Lowman	AMSAV-R-MK	18 February 1969

Figure 1-2. Preservation, Packaging, Packing and Marking Requirements.

SECTION II

TEST EQUIPMENT, SPECIAL TOOLS, AND MATERIALS

2-1. TEST EQUIPMENT.

Refer to table 2-1 for a list of test equipment required for the general support maintenance of Model 23064-001 DC Starter-Generator.

Table 2-1. Test Equipment Required

FMC	PART, MODEL, MILDES OR EQUIVALENT	NOMENCLATURE	TECHNICAL DESCRIPTION
99664	7199	Test Stand, Aircraft Gen.	Capable of driving generator at 6200 - 12,000 rpm, full load or 14,000 rpm, no load.
99664	708-5	Test Stand, Electrical	Load Bank for testing DC equipment.
81349	MIL-T-6448 Type B1	Tester, Starter Torque	Used for checking torque.

2-2. SPECIAL TOOLS.

Refer to table 2-2 for a list of special tools required for the general support maintenance of Model 23064-001 DC Starter-Generator.

Table 2-2. Special Tools Required

FMC	PART, MODEL, MILDES OR EQUIVALENT	NOMENCLATURE	TECHNICAL DESCRIPTION
83298	QB80059-3	Spline wrench	To hold shaft while removing fan lock nut.
19315	QB80338-1	Bearing puller	To remove bearing, and to remove armature from stator.
54522	#4	Arbor Press	To support end bell assy during disassembly
06365	BEKOMATIC 400B	Dynamic balance machine	To check armature for proper balance.
64359	1050	Scale	To check brush spring tension

2-3. CONSUMABLE MATERIALS.

Refer to table 2-3 for a list of consumable materials required for the general support maintenance of Model 23064-001 DC Starter-Generator.

TABLE 2-3. CONSUMABLE MATERIALS REQUIRED

ITEM NO.	MATERIAL	TYPE OR GRADE	GOVERNMENT SPECIFICATION
1.	Cleaning solvent	–	P-D-680
2.	Varnish	–	MIL-V-173
3.	Anti-seize compound	–	JAN-A-669
4.	Grease	–	MIL-G-23827
5.	Lockwire	–	MS20995C32
6.	Sandpaper	5/0	P-P-101

SECTION III

GENERAL SUPPORT MAINTENANCE

3-1. ILLUSTRATED PARTS BREAKDOWN.

Each part listed on the Illustrated Parts Breakdown is shown in disassembly order, except that attaching parts are listed after the parts they attach, under the heading of "ATTACHING PARTS."

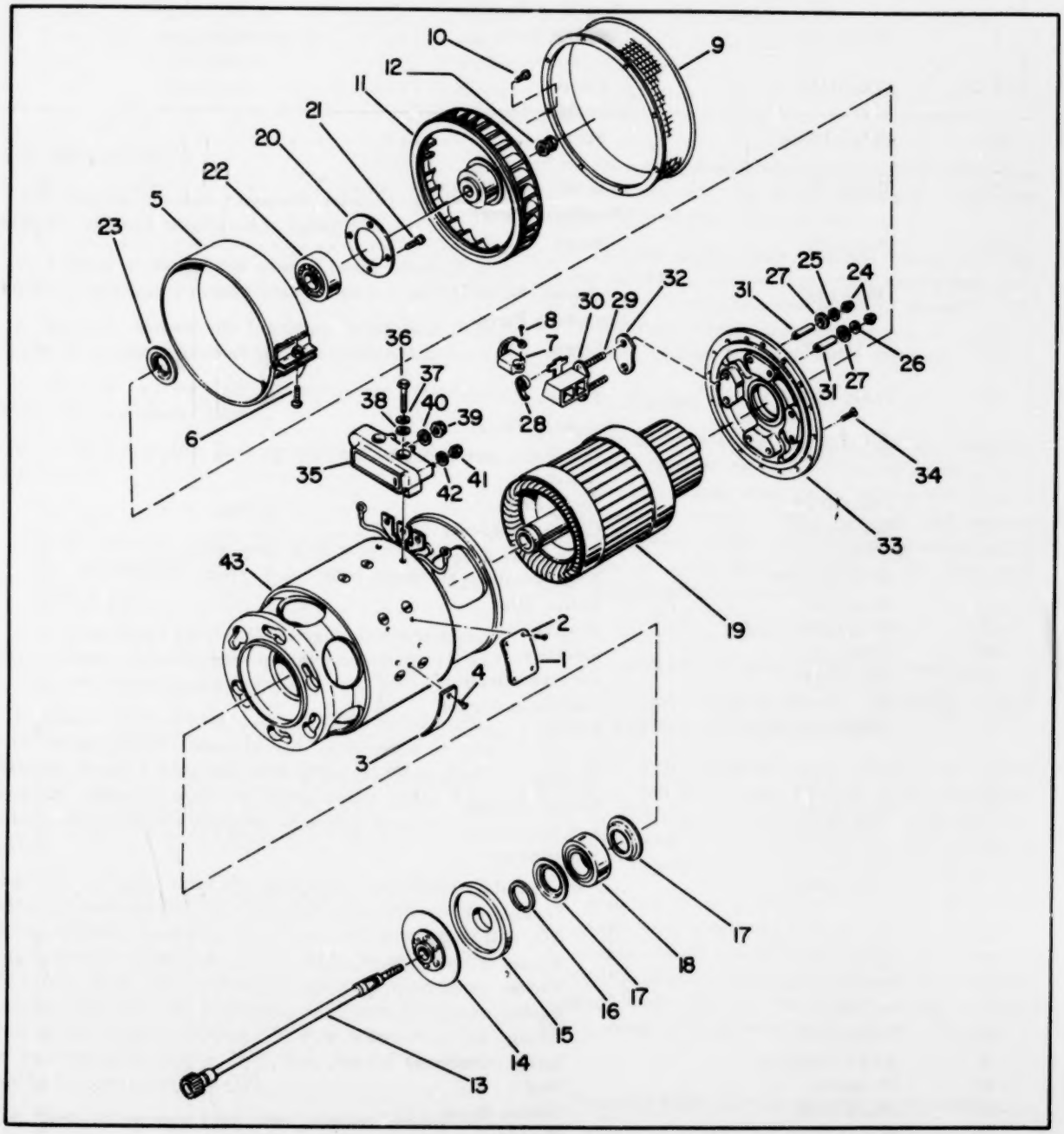

Figure 3-1. Exploded View of 23064-001 DC Starter-Generator.

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Qty Per Assy
3-1-	23064-001	Starter-Generator Assy	1
-1	06-201034	. Plate, Instruction	1
		(Attaching Parts)	
-2	AN535-2-2	. Screw, Drive	4
		---*---	
-3	06-109978	. Nameplate	1
		(Attaching Parts)	
-4	AN535-2-2	. Screw, Drive	2
		---*---	
-5	23064-1150	. Cover	1
		(Attaching Parts)	
-6	AN502-10-14	. Screw	1
		---*---	
-7	30300-1282	. Brush	4
		(Attaching Parts)	
-8	05-340201	. Screw	4
		---*---	
-9	23064-1380	. Shroud, Air deflection	1
		(Attaching Parts)	
-10	05-341300	. Screw	8
		---*---	
-11	23064-1360	. Fan	1
		(Attaching Parts)	
-12	05-322503	. Nut, Two-piece lock	1
		---*---	
-13	23064-1011	. Shaft, Drive	1
-14	30059-1040	. Clutch, Dampener	1
-15	31228-1095	. Back Plate dampener	1
-16	MS16626-1098	. Ring, Retaining	1
-17	05-101001	. Baffle, Disc	2
-18	07-111337	. Bearing	1
-19	23047-1052	. Armature	1
-20	23064-1370	. Retainer, Bearing	1
		(Attaching Parts)	
-21	AN501A10-10	. Screw	4
		---*---	
-22	07-111259	. Bearing	1
-23	G128-178	. Baffle, Bearing	1
	23064-1270	. End Bell Assy	1
		. (complete)	
	23064-1280	. . Brush Holder Assy	4
		(complete)	
-24	MS20365-1032C	. . . Nut, Self-locking	8
-25	AN960-10L	. . . Washer	8
-26	05-374101	. . . Washer	4
-27	05-374093	. . . Washer	4
-28	23033-1120	. . . Spring	8
-28	23064-1350	. . . Spring (alternate)	8
-29	05-360015	. . . Stud	8
-30	23064-1180	. . . Holder, Brush	4
-31	05-631122	. . . Sleeving	8
-32	23014-1039	. . . Plate, Insulator	4
-33	23064-1260	. . End Bell	1

3-1-			
		(Attaching Parts)	
-34	AN509-8-8	. . Screw	8
		---*---	
-35	23064-1410	. Block, Terminal	1
		(Attaching Parts)	
-36	AN3-15A	. Screw	2
-37	AN935-10L	. Washer	2
-38	AN960-10L	. Washer	2
-39	MS20364B-624C	. Nut	3
-40	AN960B616	. Washer	3
-41	MS20364B-1032C	. Nut	2
-42	AN960B10	. Washer	2
-43	23064-300	. Stator	1

3-2. DISASSEMBLY.

All numbers in this paragraph refer to the index numbers of items illustrated in figure 3-1.

a. Loosen screw (6) that clamps brush cover (5) to housing; spread and remove brush cover.

b. Remove screws (8) fastening brush and field leads; then remove brushes (7) from brush holders.

c. Remove screws (10) fastening air deflection shroud (9) and remove shroud.

d. Remove two-piece lock nut (12) and fan (11) from drive shaft.

NOTE

Hold shaft at spline end, with wrench, Part No. QB80059-3 (table 2-2), when removing locknut (12).

e. Tap out drive shaft (13), using a plastic hammer; then remove clutch dampener (14) from shaft (13) by using arbor press (table 2-2).

f. Remove screws (34), end bell (33), bearing (22), and brush holder assembly (30) with armature assembly. Remove dampener back plate (15) from drive end of armature shaft by using puller (table 2-2), which also removes armature assembly from housing (43).

g. To separate armature assembly from end bell (33), support end bell in a suitable arbor press; then press armature assembly out of end bell bearing, using a suitable adapter on end of shaft. Remove baffle (23) from shaft. To disassemble armature, remove retaining ring (16) and disc-baffle (17) from the armature shaft. Remove bearing (18) from armature, using a bearing puller (table 2-2); then remove the disc-baffle (17) from armature (19).

h. Remove screws (21); then remove bearing retainer (20). Press ball bearing (22) out of end bell (33).

i. Do not disassemble brush holder (30) and springs (28) from end bell (33) unless inspection reveals that replacement of parts is necessary.

j. Do not disassemble terminal block (35) from stator assembly unless inspection shows that it is necessary. Do not disassemble stator assembly (43). If inspection reveals that replacement of coils is necessary, replace complete stator assembly.

3-3. CLEANING.

Clean all parts except armature, bearings, brushes, and stator by washing in dry cleaning solvent, (item 1, table 2-3). Clean armature by wiping with a cloth moistened in solvent. Clean bearings and brushes with a dry cloth. Blow dust and other foreign matter from inside stator with compressed air; then wipe with a cloth moistened in solvent.

CAUTION

Do not use carbon tetrachloride for cleaning.

3-4. TESTING REQUIREMENTS (DURING OVERHAUL, BEFORE ASSEMBLY OF UNIT.)

a. End Bell Assembly Test. Check each brush holder to end bell, using 110-volt AC or DC power source, with one 7-1/2 watt test lamp, and apply for one (1) second between brush holders and casting at one time. If grounded, the end bell must be repaired.

b. Armature Test. Using test circuit described in paragraph 3-4*c*, touch one lead of the test circuit to the armature shaft and the other lead to the commutator risers. Also check between each of the two commutator bands and the commutator risers. If lamp lights, armature is grounded and must be replaced.

NOTE

Terminal block must be removed for this test.

c. Stator Assembly Test. Use a 110-volt AC or DC power source, with one 7-1/2 watt test lamp con-

nected in series, for testing armature and field windings. Touch one lead to terminal "A"; if lamp lights, stator is grounded and must be replaced. Using an ohmmeter, check for continuity by touching one lead of ohmmeter to negative field lead, and the other lead to terminal "A".

3-5. REPAIR AND REPLACEMENT.

a. Repair Armature Commutator.

(1) If inspection reveals that commutator is rough, pitted, scored, or burned, refinish in a lathe that is accurately set up and adjusted.

(2) The commutator shall be turned with the armature mounted on its finished bearing journals and driven so as to maintain a commutator surface speed of 740 to 1110 feet per minute.

(3) The finished surface shall consist of 60 to 90 degree threads maintaining a finish of 150 microinches, RMS.

(4) The undercut slots shall be free of mica and burrs. Any deburring operation shall not affect the commutator finish.

NOTE

A diamond tipped tool having a maximum tool tip radius of 0.006 inch including tool wear is necessary for uniformity of finish.

(5) Remove only the material necessary to clean and true-up the commutator surface. Replace armature that necessitates turning of commutator to less than a minimum diameter of 2.030 inches. Hold commutator diameter concentric with bearing journals within 0.0005-inch T.I.R.

b. Undercutting the Mica. If the depth of undercut remaining after the turning operation has been completed is less than 0.015 inch, the mica between the commutator bars should be re-undercut to 0.032 inch deep maximum, by 0.052 inch wide. Use a triangular scraper to remove all excess mica, sharp edges, and burrs from between the commutator bars. Use a bristle brush to remove metal chips and mica particles from the slots between the commutator bars. Check for concentricity as described in paragraph 3-5*a*(5).

c. Polishing the Commutator. Mount the armature in a lathe and operate at a speed of 500 to 600 rpm. Polish commutator by applying 5/0 sandpaper (not emery paper)(item 6, table 2-3) backed up by an accurately cut block of rigid material that will fit the commutator over its entire length, and for at least one-third of its periphery. Remove any dust or particles from between the commutator bars with a bristle brush.

d. Balancing. After commutator refinishing, the armature should be checked for proper balance, using dynamic balance machine (table 2-2), which should be within 20 grain-inches at each end. If a balance correction is required, mill the stainless steel retaining bands at each end of the armature lamination stack (0.020 inch deep, maximum, and 0.62 inch wide, maximum) until the proper degree of balance is obtained. Cuts must be a minimum of 0.15 inch from the edge of the hoop.

e. Brush Spring Tension.

(1) Using a new brush assembly, (see figure 3-2), cut a groove down the center of each side and across the bottom of both sections. When prepared in this manner, each brush section will have a continuous groove around two sides and the bottom.

CAUTION

This operation renders this brush assembly unfit for service. Use only for checking spring tension.

(2) Place a thin wire around the brush in the groove; then insert the brush in one of the brush holders. Tie the two ends of the wire together and hook a spring scale in the loop formed.

(3) Raise the brush, by means of the scale, until the lower end of the brush is even with the bottom edge of the brush holder. When in this position, the brush spring tension should be between 55 and 65 ounces. Take an average of several readings. If the spring tension is out of this range, replace the spring.

(4) Measure the brush spring tension of each section in the remaining brush holders for uniformity.

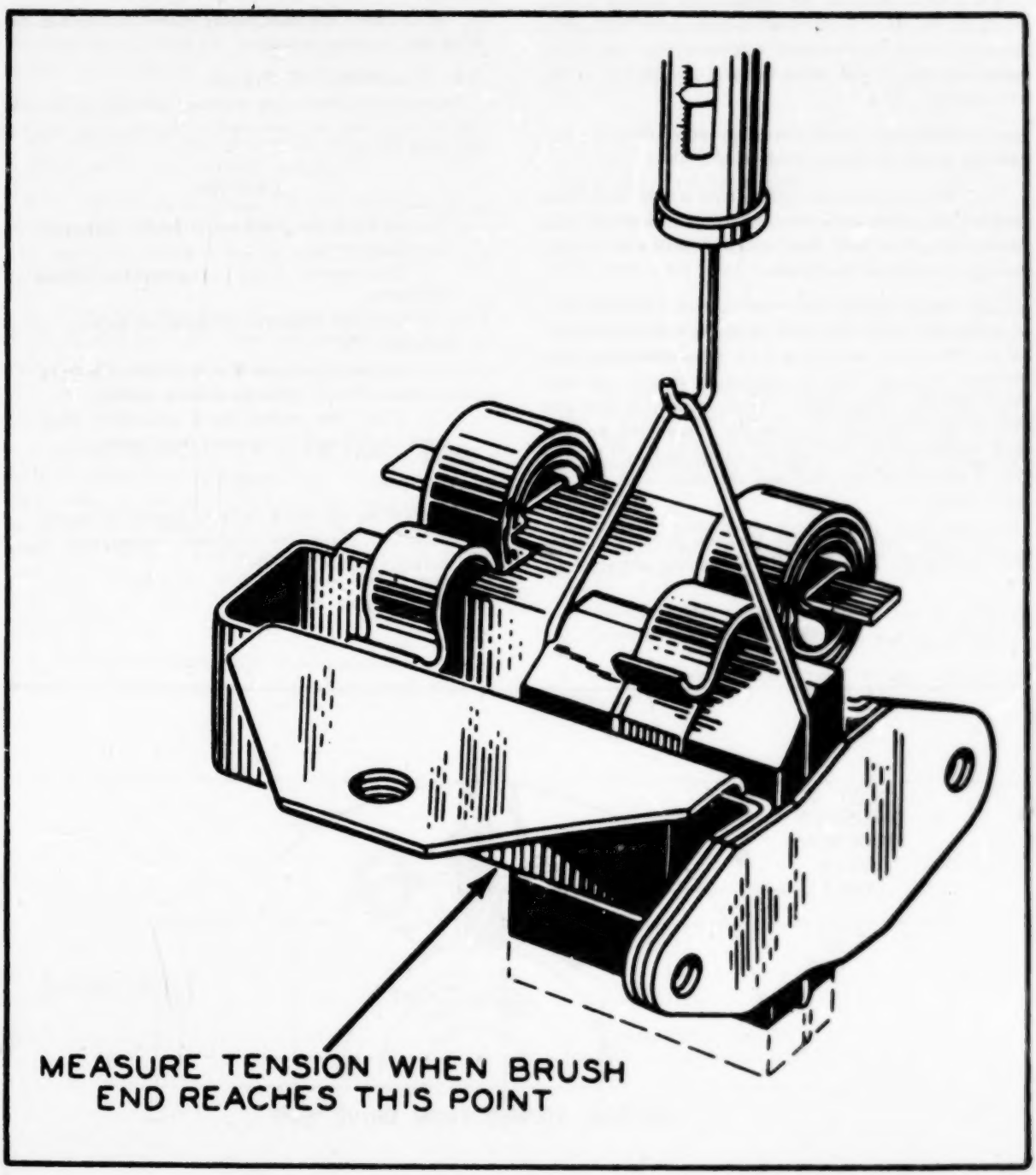

Figure 3-2. Checking Brush Spring Tension.

f. Brush Replacement. New brushes must be properly seated on the commutator surface before starting the Starter-Generator performance tests. Although they are of the so-called instant filming type, new brushes should be sanded and run in to properly seat them on the commutator surface before applying full load to the Starter-Generator. Failure to properly seat the brushes can result in excessive sparking, which will cause burning and pitting of the commutator.

g. Preliminary Brush Seating. Provide a partial seating of the brushes as follows:

(1) Raise each brush spring with a stiff wire hook and lift the brush away from the commutator, until the brush spring can hold the brush in position by resting against the side of the brush.

(2) Place a strip of 5/0 or finer sandpaper (item 6, table 2-3) slightly wider than the combined width of the two brush halves, around the commutator with the sand side out. Cut the sandpaper strip to 1/8 inch less than the commutator circumference. Secure one end of the sandpaper strip to the commutator surface with masking tape so that the taped end will lead in the direction of rotation, and the other end will remain loose.

(3) Lower one set of the brushes in place against the sandpaper, and carefully rotate the armature by hand in the normal direction of rotation (see figure 3-3) until a full seat is obtained on each brush. Do not sand excessively. Remove excess carbon dust from sandpaper before sanding next set of brushes. Sand one set of brushes at a time.

(4) Remove the sandpaper; remove all carbon dust with dry, compressed air.

3-6. FLASHING THE FIELD.

Starter-Generators with reversed polarity in the output voltage may be corrected by flashing the field as outlined below.

CAUTION

Do not flash the field while Starter-Generator is in operation.

a. Disconnect leads to external voltage regulator.

b. Connect negative terminal of battery to terminal "E"

c. Connect the positive terminal of battery to terminal "A" through a knife switch.

d. Close the switch for 5 seconds – then open switch and disconnect from battery.

NOTE

If flashing the field fails to correct generator polarity, check for incorrect connections or defective field circuit.

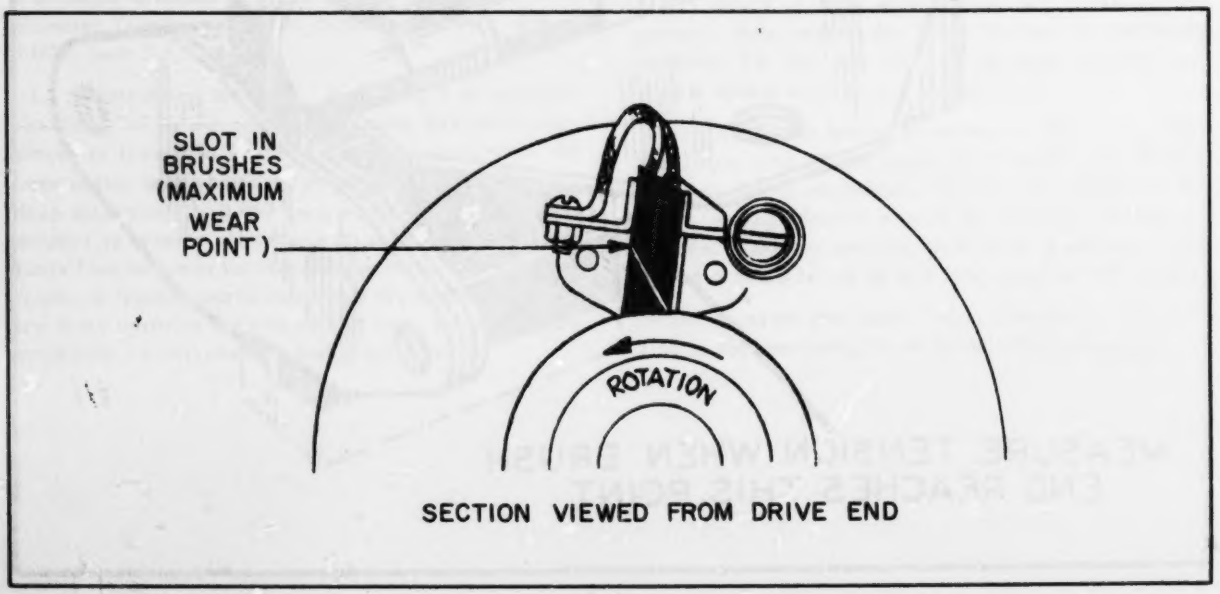

Figure 3-3. Correct Position of Brushes and Springs with Regard to Armature Rotation.

3-7. MODIFICATION CRITERIA.

None required.

3-8. LUBRICATION.

Fill ball bearings (18 and 22, figure 3-1) one-third to one-half full with grease, (item 4, table 2-3). (Approximately 0.076-0.125 grams of grease will be required per bearing.)

3-9. REASSEMBLY.

All numbers in this paragraph refer to the index numbers of items illustrated in figure 3-1.

a. If identification plate (1) was removed during disassembly, assemble with attaching drive screws (2), and coat surface lightly with varnish, (item 2, table 2-3) or equivalent.

b. Press ball bearing (22), using arbor press (table 2-2), in end bell (33); then secure with bearing retainer (20). Apply anti-seize compound (item 3, table 2-3) to threads of screws (21). Install and lockwire (item 5, table 2-3).

c. Install disc-baffle (17) on drive end of armature with recessed area facing armature. Support armature in an arbor press; then press new ball bearing (18) on armature shaft, pressing on bearing inner race. Install other disc-baffle (17) over armature shaft with recessed area facing away from armature. Install retaining ring (16) and make certain that ring engages the groove fully.

d. Install disc-baffle (23) with recess toward commutator, on commutator end of armature shaft. Support armature in an arbor press; then position end bell with bearing assembled, over commutator end of armature shaft and press bearing on armature shaft end. Press on inner race of bearing.

e. Position end bell, with armature assembly over end of stator. Apply anti-seize compound (item 3, table 2-3) and secure with screws (34). Make certain drive end bell bearing is fully seated in stator housing.

f. Install dampener back plate (15) on armature. Wear face of dampener plate should be 9.009 from the gage point on the drive shaft.

g. Install clutch dampener (14) over small spline end of drive shaft (13). Back face of hub should be 8.822 from gage point on the drive shaft.

h. Install drive shaft through armature, making certain splines of drive shaft are fully engaged with splines of armature.

i. Install fan (11) and secure with two-piece nut (12). Tighten inner nut to 180-200 inch-pounds, and outer nut to 125-150 inch-pounds while holding shaft (13) from rotating with wrench, Part No. QB80059-3 (table 2-2).

j. Install brushes (7); then secure brush and field leads with screws (8). Make electrical connections as per figure 3-4.

k. Install brush cover (5) and secure with screw (6). Cover may be assembled in any angular position.

l. Install air deflection shroud (9) and secure with screws (10).

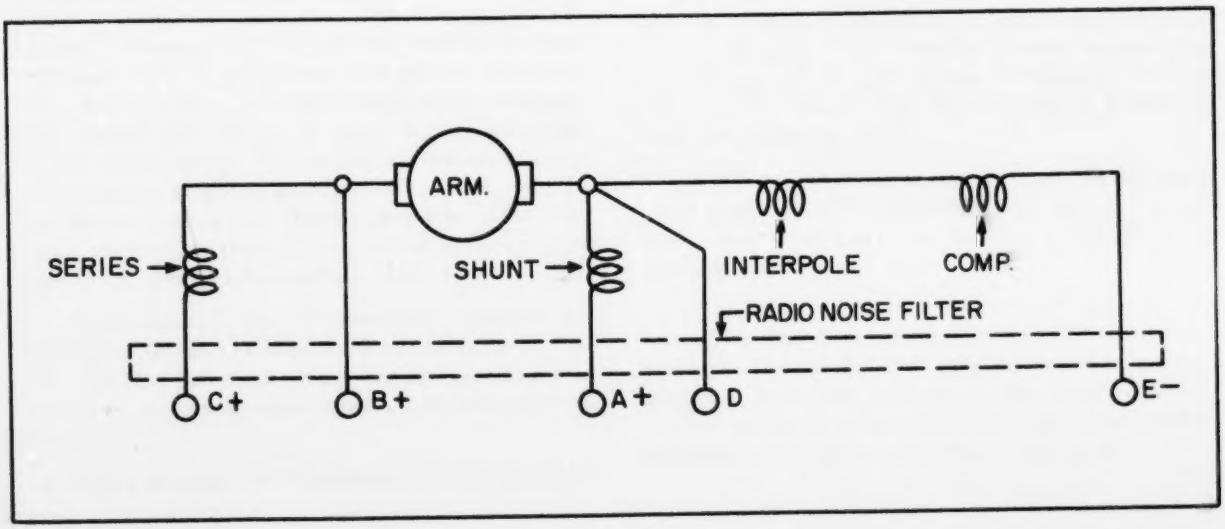

Figure 3-4. Electrical Connections.

SECTION IV
FINAL TEST PROCEDURES

4-1. TEST EQUIPMENT.

Test equipment shall include a variable speed test stand capable of driving the generator at speeds from 4,400 to 8,000 rpm at full load and 10,000 rpm at no load (see table 2-1). The test stand should be equipped with suitable instrumentation to measure torque, speed, voltage, current, and temperature. Adequate circuitry must also be provided to load the generator. Mount Starter-Generator on test stand. Connect generator terminals to test stand as shown on figure 3-4.

4-2. TEST CONDITIONS.

Air inlet temperature shall be between 50° -104°F (10° -40°C). Brushes shall be seated 100 percent minimum in the direction of rotation, and 90 percent in the axial direction before starting test. Brush seating may be accomplished by operating the Starter-Generator as a generator at approximately 5,000 rpm at reduced load.

4-3. TEST REQUIREMENTS (AFTER OVERHAUL).

a. Maximum Speed for Regulation. With regulator connected to the Starter-Generator, but with operational warm-up, operate the Starter-Generator self-excited at 9,000 rpm, 30 volts, and no load. Record field current, commutation, and frame temperature. Shunt field current shall not be less than 0.81 amperes. There must be no arcing between brushes and commutator.

b. Continuous Operating Speed. With regulator connected to Starter-Generator, operate Starter-Generator at 8,000 rpm, 30 volts, 300 amps, until the frame temperature shows no more than 2°F rise in five (5) minutes. Measure and record the voltage between "D" and "E", air blast inlet temperature, commutation, field current, and frame temperature. Commutation should not exceed pinpoint arcing along the edges of the brushes. The paralleling voltage must be within the limits shown on Figure 4-1. If D-E volts is not within limits, see Troubleshooting, table 4-1. Frame temperature must not exceed the air-in by more than 175°F. See Troubleshooting, table 4-1.

c. Compounding and Commutation. Operate at 8,000 rpm, 30 volts. Check for compounding at 0, 75, 150, 225, and 300 amps. Field current must increase with load, and commutation must not exceed pinpoint arcing.

d. Minimum Speed for Regulation. Operate at 4,400 rpm, 30 volts, 300 amps, for demonstrating ability to operate at minimum speed for regulation. Record field current, frame temperature, and commutation. Shunt field current shall not exceed 8.0 amperes, and the external load resistance must be above 1.25 ohms. Commutation should not exceed pinpoint arcing.

e. No-load Speed. Operate the starter-generator as a starter with no load. Apply 23 volts to terminals C(+) and E(−). The shunt field (terminal B(+)) should be open. The no-load speed shall be at least 3,140 rpm.

f. Radial Vibration. With the Starter-Generator mounted in a resilient test stand and the drive shaft supported, operate the unit with no load as in *e* above. Radial vibration shall not exceed 0.001-inch total deflection.

g. Dielectric Test. Remove generator from test stand and, while still hot as a result of testing, conduct a hi-pot to ground test of 110 volts, ac rms, 60 cps for one minute. The leads from the terminal block must be removed from studs due to imbedded capacitors connected to ground. A dummy block without imbedded capacitors may be used for test. Generator shall not be grounded in any circuit.

h. Locked Rotor Test.

CAUTION

Do not connect shunt field (terminal B(+)) to any other terminal during the locked rotor test.

(1) With rotor locked, apply voltage between "C" and "E" terminals and increase until output torque is 475 inch-pounds. Do not energize the unit for more than two (2) seconds. Record current and voltage. Current shall be not greater than 600 amperes, and voltage shall not exceed 30 volts.

(2) Repeat (1) above except increase voltage until output torque is 175 inch-pounds. Voltage and current shall not exceed curve in figure 4-2. See Troubleshooting, table 4-1.

i. Commutator Run-out Check. Make commutator run-out checks while rotating the armature on its own bearings. Record the total indicated run-out and the maximum bar-to-bar difference. Maximum total indicated run-out is to be 0.0005 inch, and the bar-to-bar difference must not be more than 0.0002 inch.

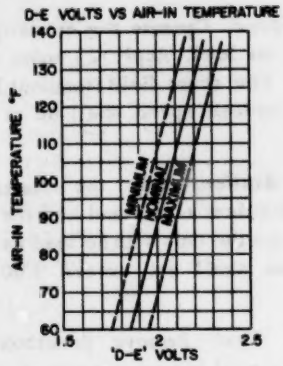

Figure 4-1. Paralleling Voltage Chart.

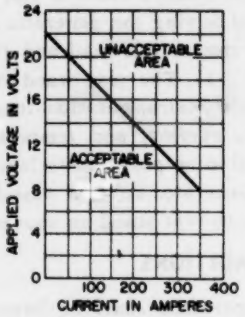

Figure 4-2. Voltage Vs Current for Locked Rotor Test at 175 Inch-Pounds Torque.

4-4. TROUBLESHOOTING.

Table 4-1 contains a list of troubles, their probable causes, and suggested remedies which may be encountered during testing or actual operation.

Table 4-1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Unit fails to operate or does not attain normal speed.	Low voltage power source.	Check power source to make certain full voltage is being applied to starter terminals.
	Defective switch in power supply line.	Replace switch.
	Damaged armature.	Replace armature assembly.
	Short circuited or open stator windings.	Replace stator assembly.
	Improperly seated brushes.	Check brush seats and increase brush run-in time.
	Eccentric commutator.	Refinish commutator. (Refer to paragraph 3-5*a*.)

Table 4-1. Troubleshooting (cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive sparking at brushes.	Short circuited or grounded field windings.	Replace stator assembly.
	Excessive clearance in bearings or rough bearing races.	Replace bearings.
	Eccentric commutator.	Refinish commutator. (Refer to paragraph 3-5 *a.*)
	Short circuit in armature windings.	Replace armature assembly.
	Brushes incorrectly installed with top bevel reversed.	Reverse and reseat brushes.
	Insufficient brush run-in with improper seating.	Run in brushes until seated.
	Severe overload or short circuit in aircraft electrical system.	Locate and correct fault.
	Brushes sticking in holders.	Free brushes.
	Weak brush springs.	Replace brush holders.
	Brushes loose in holders.	Replace brushes. If still loose, replace brush holder assemblies.
Noisy operation.	Rough bearings.	Replace bearings.
	Scored or worn drive splines.	Replace drive shaft.
	Fan bent and/or rubbing.	Straighten or replace fan.
Unit vibrates.	Unbalanced armature assembly.	Balance or replace armature assembly.
	Excessive run-out of armature bearings.	Replace armature bearings.
Generator produces full voltage – but with reversed polarity.	Voltmeter leads reversed.	Connect voltmeter correctly.
	Residual magnetism in field poles creates wrong polarity.	Flash the field in accordance with paragraph 3-6.

Table 4-2. Troubleshooting (cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
Starter-Generator overheats (frame temperature 175°F in excess of air inlet temperature).	Continuous overload.	Check aircraft electrical system for grounds, etc. Make corrections as necessary.
D-E volts not with-in limits of figure 4-1. Also see causes and remedies below.	Obstruction to air flow through generator.	Remove obstruction.
	Commutation.	Refinish commutator and reseat brushes.
Using procedures in paragraph 4-3-*b*(2) but unit does not meet requirements of curve in figure 4-2.	Open circuit in armature.	Replace armature.
	Open or short circuit in stator winding.	Replace stator winding.

SECTION V
DIFFERENCE DATA SHEETS

5-1. Not applicable.

APPENDIX A
REFERENCES

NOTE

The following references of the issue in effect at the date of this publication are required for use by operational personnel in performance of their duties.

TB 746-93-2	Painting and Marking of Army Aircraft
TM 38-750	Army Equipment Record System
TM 55-405-3	Army Aviation Maintenance Engineering Manual: Maintenance of Aircraft Systems

APPENDIX B
REPAIR PARTS AND SPECIAL TOOLS LISTS
(Current as of 6 November 1969)

Section I INTRODUCTION

B-1. SCOPE.

This appendix lists repair parts, special tools, test and support equipment, and maintenance supplies required for the performance of general support maintenance of the starter-generator, engine.

B-2. GENERAL.

The Repair Parts and Special Tools Listing is divided into the following sections.

a. Repair Parts – Section II. A list of repair parts authorized for the performance of maintenance at the general support level in figure and item number sequence. Maintenance supplies (MSUP) are listed within the section in ascending Federal stock number (FSN) sequence.

b. Special Tools, Test and Support Equipment – Section III. A list of special tools, test and support equipment authorized for the performance of maintenance at the general support level.

c. Federal Stock Number and Reference Number Index – Section IV. This section is divided as follows:

(1) A list of FSNs in ascending numerical sequence cross-referenced to the illustration figure and item number.

(2) A list of reference numbers (R/Ns) in ascending alpha-numerical sequence cross-referenced to the manufacturer's Federal supply code, illustration figure and item number.

B-3. EXPLANATION OF COLUMNS.

The following provides an explanation of columns in the tabular lists in sections II and III:

a. Source, Maintenance, and Recoverability Codes (SMR) – Colum 1.

(1) *Source code.* Indicates the selection status and source for the listed item. Source codes used are:

CODE	EXPLANATION
P	Applies to repair parts which are stocked in or supplied from GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
X1	Applies to repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.

X2	Applies to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain same through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels.

(2) *Maintenance code.* Indicates the lowest category of maintenance authorized to install the listed item. Maintenance codes used are:

CODE	EXPLANATION
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance

(3) *Recoverability code.* Indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable.

b. Federal Stock Number – Column 2. Indicates the FSN assigned to the item and will be used for requisitioning purposes. Items source coded X1 are not assigned an FSN.

c. Description – Column 3. Indicates the Federal item name and any additional description of the item required. The description column contains the following subcolumns.

(1) *Reference number and manufacturer's code.* Indicates a part number or other R/N for the listed item followed by the applicable five-digit Federal supply code for manufacturers in parentheses.

(2) *Usable on code.* Not applicable.

d. Unit of Measure (U/M)– Column 4. A two-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based (e.g., EA, FT, PR).

e. Quantity Incorporated in Unit – Column 5. Indicates the quantity of the item used in the assembly. A "V" appearing in this column instead of a quantity indicates that a definite quantity cannot be indicated.

f. Thirty-day GS Maintenance Allowance – Column 6.

(1) The allowance column is divided into three subcolumns. Indicated in each subcolumn, opposite the first appearance of each item, is the total quantity of items authorized for the number of equipments supported. Items authorized for use as required, but not for initial stockage, are identified with an asterisk (*) in the allowance column.

(2) The quantitative allowance for GS level of maintenance will represent initial stockage for a 30-day period for the number of equipments supported.

(3) Determination of the total quantity of parts required for maintenance of more than 100 of these equipments can be accomplished by converting the equipment quantity to a decimal factor by placing a decimal point before the next to last digit of the number to indicate hundredths, and multiplying the decimal factor by the parts quantity authorized allowance for 51-100 allowance column. Example: authorized allowance for 51-100 equipments is 40; for 150 equipments, multiply 40 by 1.50, or 60 parts required.

g. One-year Allowance per 100 Equipments/Contingency Planning Purposes – Column 7. Indicates opposite the first appearance of each item, the total quantity required for distribution and contingency planning purposes. The range of items indicates total quantities of all authorized items required to provide for adequate support of 100 equipments for 1 year.

h. Depot Maintenance Allowance per 100 Equipments – Column 8. Not applicable.

i. Illustration – Column 9. Illustrations appear in the narrative portion of this manual. This column is divided as follows:

(1) *Figure number – column 9a.* Indicates the figure number of the illustration in which the item is shown. Appearances of the letters "MSUP" in this column indicate maintenance supplies located in section II; the letters "TOOL" indicate special tools located in section III.

(2) *Item number – column 9b.* Indicates the callout number to reference the item in the illustration.

B-4. SPECIAL INFORMATION.

Attaching parts are listed following the part(s) they attach and the same indent. They are separated from the part(s) by the words "attaching parts" in the description column. When they attach an assembly which is broken down to show detail parts, the attaching parts are separated from the details of the assembly by the symbol "---*---." Details of the assembly are then indented one space to the right of their next higher assembly, which appears above the attaching parts.

B-5. HOW TO LOCATE REPAIR PARTS.

a. When FSN or R/N is unknown:

(1) *First.* Find the exploded view illustration of the assembly or subassembly to which the repair part belongs.

(2) *Second.* Identify the repair part on the illustration and note the illustration figure and item number of the repair part.

(3) *Third.* Using the Repair Parts Listing, find the figure and item number listed in the illustration column.

b. When FSN or R/N is known:

(1) *First.* Using the index of FSNs and R/Ns, find the pertinent FSN or R/N. This index is in ascending FSN sequence followed by a list of R/Ns in ascending alpha-numerical sequence, cross-referenced to the illustration figure and item number.

(2) *Second.* Using the Repair Parts Listing, find the figure and item number listed in the illustration column referenced in the index of FSNs and R/Ns.

B-6. FEDERAL SUPPLY CODES FOR MANUFACTURERS.

CODE	MANUFACTURER
21482	Famco Machine Co. 3104 Sheridan Rd. Kenosho, WI 53140
31345	Lear Siegler Inc. Power Equipment Div. P. O. Box 6719 Cleveland, OH 44101
81348	Federal Specifications Promulgated by General Services Administration
81349	Military Specifications Promulgated by Standardization Div. Directorate of Logistic Services DSA
88044	Aeronautical Standards Group Dept. of Navy and Air Force
96906	Military Standards Promulgated by Standardization Divison Directorate of Logistic Services DSA

(1) SOURCE, MAINT AND RECOV CODE (a) SOURCE CODE	(b) MAINT LEVEL	(c) RECOV CODE	(2) FEDERAL STOCK NUMBER	REFERENCE NUMBER & MFR CODE	(3) DESCRIPTION	USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 30-DAY GS MAINT ALW (a) 1 - 20	(b) 21 -50	(c) 51 - 100	(7) 1-YR ALWPER 100 EQUIP CNTGCY	(8) DEPOT MAINT ALWPER 100 EQUIP	(9) ILLUSTRATION (a) FIG NO	(b) ITEM NO
			2925-063-0788	23064-001 (31435)	STARTER-GENERATOR,ENGINE.....		EA							1-1	
					SECTION II REPAIR PARTS STARTER-GENERATOR,ENGINE										
P	H		5305-253-5609	MS21318-13 (96906)	SCREW,DRIVE.....		EA	4	*	*	*			3-1	2
P	H		2925-756-2768	06-109978 (31435)	PLATE,IDENTIFICATION.....		EA	1	*	*	*			3-1	3
					ATTACHING PARTS										
P	H		5305-253-5609	MS21318-13 (96906)	SCREW,DRIVE.....		EA	2	*	*	*			3-1	4
					---*---										
P	O		2925-763-0863	23064-1150 (31435)	COVER,ELECTRICAL.....		EA	1	*	*	*			3-1	5
					CONTACT BRUSH ACCESS										
					ATTACHING PARTS										
P	O		5305-150-9209	AN502-10-14 (88044)	SCREW,MACHINE.....		EA	1	*	*	*			3-1	6
					---*---										
P	H		5977-143-6774	30300-1282 (31435)	BRUSH,ELECTRICAL CONTACT.....		EA	4	*	*	*			3-1	7
					ATTACHING PARTS										
P	H		5305-143-3289	05-340201 (31435)	SCREW,MACHINE.....		EA	4	*	*	*			3-1	8
					---*---										
P	H		2925-728-8118	23064-1380 (31435)	HOUSING,IMPELLER,FAN.....		EA	1	*	*	*			3-1	9
					ATTACHING PARTS										
P	H		5305-988-7601	MS16995-25 (96906)	SCREW,CAP,SOCKET HEAD.....		EA	8	*	*	*			3-1	10
					---*---										
P	H		2925-728-8117	23064-1360 (31435)	IMPELLER,FAN,AXIAL.....		EA	1	*	*	*			3-1	11
					ATTACHING PARTS										
P	H		6115-315-0602	05-322503 (31435)	LOCK NUT.....		EA	1	*	*	*			3-1	12
					---*---										
P	H		2925-890-2743	23064-1011 (31435)	SHAFT,DAMPENER DRIVE.....		EA	1	*	*	*			3-1	13
P	H		2925-017-2614	30059-1040 (31435)	CLUTCH,DAMPER.....		EA	1	*	*	*			3-1	14
P	H		2925-774-8247	31228-1095 (31435)	BACKING PLATE,GENERATOR DAMPENER...		EA	1	*	*	*			3-1	15
P	H		5340-817-8542	MS16626-1098 (96906)	RING,RETAINING.....		EA	1	*	*	*			3-1	16
P	H		2925-735-7493	05-101001 (31435)	DEFLECTOR,DIRT AND LIQUID.....		EA	2	*	*	*			3-1	17
P	H		3110-014-8337	07-111337 (31435)	BEARING,BALL,ANNULAR.....		EA	1	*	*	*			3-1	18
X2	H			23047-1052 (31435)	ARMATURE.....		EA	1						3-1	19
P	H		3110-890-7772	23064-1370 (31435)	PLATE,RETAINING,BEARING.....		EA	1	*	*	*			3-1	20
					ATTACHING PARTS										
P	H		5305-614-0247	MS35266-64 (96906)	SCREW,MACHINE.....		EA	4	*	*	*			3-1	21
					---*---										
P	H		3110-014-8335	07-111259 (31435)	BEARING,BALL,ANNULAR.....		EA	1	*	*	*			3-1	22
P	H		5310-596-3161	G128-178 (31435)	WASHER,SADDLE.....		EA	1	*	*	*			3-1	23
X1				23064-1270 (31435)	END BELL.....			1						3-1	
P	H		2925-728-8113	23064-1280 (31435)	.HOLDER,ELECTRICAL CONTACT BRUSH...		EA	4	*	*	*			3-1	
P	H		5310-061-7326	MS21045-3 (96906)	..NUT,SELF-LOCKING,HEXAGON.....		EA	8	*	*	*			3-1	24
P	H		5310-167-0834	AN960-10L (88044)	..WASHER,FLAT.....		EA	8	*	*	*			3-1	25
P	H		5970-118-8837	05-374093 (31435)	..INSULATOR,WASHER.....		EA	4	*	*	*			3-1	27
P	H		5630-247-7240	23033-1122 (31435)	..SPRING,HELICAL EXTENSION.....		EA	8	*	*	*			3-1	28
P	H		5307-533-9843	05-360015 (31435)	..STUD,PLAIN.....		EA	8	*	*	*			3-1	29
X1				23064-1180 (31435)	..HOLDER,BRUSH.....			4						3-1	30

(1) SOURCE, MAINT AND RECOV CODE (a) SOURCE CODE	(b) MAINT LEVEL	(c) RECOV CODE	(2) FEDERAL STOCK NUMBER	REFERENCE NUMBER & MFR CODE	(3) DESCRIPTION	USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 30-DAY GS MAINT ALW (a) 1 - 20	(b) 21 -50	(c) 51 - 100	(7) 1-YR ALWPER 100 EQUIP CNTGCY	(8) DEPOT MAINT ALWPER 100 EQUIP	(9) ILLUSTRATION (a) FIG NO	(b) ITEM NO
P	H		5970-109-2677	05-631122 (31435)	..INSULATION SLEEVE.....		EA	8	*	*	*			3-1	31
P	H		2925-725-5665	23014-1039 (31435)	..PLATE,INSULATION BRUSH HOLDER....		EA	4	*	*	*			3-1	32
X2	H			23064-1260 (31435)	.RING,HOLDER.....		EA	1						3-1	33
					ATTACHING PARTS										
P	H		5305-057-0491	MS2469455 (96906)	.SCREW,MACHINE.....		EA	8	*	*	*			3-1	34
					---*---										
P	H		2925-774-8138	23064-1410 (31435)	TERMINAL BOARD.....		EA	1	*	*	*			3-1	35
					ATTACHING PARTS										
P	H		5306-151-0779	AN3-15A (88044)	BOLT,MACHINE.....		EA	2	*	*	*			3-1	36
P	H		5310-045-3296	MS35338-43 (96906)	WASHER,LOCK.....		EA	2	*	*	*			3-1	37
P	H		5310-167-0834	AN960-10L (88044)	WASHER,FLAT.....		EA	2	*	*	*			3-1	38
					---*---										
P	H		5310-926-5832	MS21083B6 (96906)	NUT,SELF-LOCKING,HEXAGON.....		EA	3	*	*	*			3-1	39
P	H		5310-187-2413	AN961-616 (88044)	WASHER,FLAT.....		EA	3	*	*	*			3-1	40
P	H		5310-637-4390	AN960E10 (88044)	WASHER,FLAT.....		EA	2	*	*	*			3-1	42
X1				23064-300 (31435)	STATOR,HOUSING ASSEMBLY.....			1						3-1	43
P	H		5305-298-8100	MS24694553 (96906)	.SCREW,MACHINE.....		EA	16	*	*	*			3-1	
					MAINTENANCE SUPPLIES										
P	O		5350-224-7205	(81348)	PAPER,ABRASIVE,FED P-P-101.....		SV	V	*	*	*			MSUP	
P	O		5970-548-9520	(81349)	INSULATING VARNISH,MIL-V-173,..... 1 QT CN		QT	V	*	*	*			MSUP	
P	O		6850-264-9038	(81348)	DRY CLEANING SOLVENT,FED P-D-680,.. TYPE 1		GL	V	*	*	*			MSUP	
P	O		8030-209-8005	(81348)	ANTISEIZE COMPOUND,FED TT-A-580,.... 1 LB CAN		CN	V	*	*	*			MSUP	
P	O		9150-985-7246	(81349)	GREASE,AIRCRAFT AND INSTRUMENT,..... MIL-G-7118, 1 LB CAN		LB	V	*	*	*			MSUP	
P	O		9505-293-4208	MS20995C32 (96906)	LOCKWIRE.....		LB	V	*	*	*			MSUP	
					SECTION III SPECIAL TOOLS, TEST AND SUPPORT EQUIPMENT										
P	P		3444-243-2654	0 (21482)	PRESS,ARBOR,HAND OPERATED.....		EA	V	*	*	*			TOOL	

SECTION IV
FEDERAL STOCK NUMBER AND REFERENCE NUMBER INDEX

STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER
2925-017-2614	3-1	14
2925-063-0788	1-1	
2925-725-5665	3-1	32
2925-728-8113	3-1	
2925-728-8117	3-1	11
2925-728-8118	3-1	9
2925-735-7493	3-1	17
2925-756-2768	3-1	3
2925-763-0863	3-1	5
2925-774-8138	3-1	35
2925-774-8247	3-1	15
2925-890-2743	3-1	13
3110-014-8335	3-1	22
3110-014-8337	3-1	18
3110-890-7772	3-1	20
3444-243-2654	TOOL	
5305-057-0491	3-1	34
5305-143-3289	3-1	8
5305-150-9209	3-1	6
5350-224-7205	MSUP	
5305-253-5609	3-1	2
5305-253-5609	3-1	4
5305-298-8100	3-1	
5305-614-0247	3-1	21
5305-988-7601	3-1	10
5306-151-0779	3-1	36
5307-533-9843	3-1	29
5310-045-3296	3-1	37
5310-061-7326	3-1	24
5310-167-0834	3-1	25
5310-167-0834	3-1	38
5310-187-2413	3-1	40
5310-596-3161	3-1	23
5310-637-4390	3-1	42
5310-926-5832	3-1	39
5340-817-8542	3-1	16
5630-247-7240	3-1	28
5970-109-2677	3-1	31
5970-118-8837	3-1	27
5970-548-9520	MSUP	
5977-143-6774	3-1	7
6115-315-0602	3-1	12
6150-264-9038	MSUP	
930-209-8005	MSUP	
150-985-7246	MSUP	
1505-293-4208	MSUP	

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AN502-10-14	88044	3-1	6
AN960-10L	88044	3-1	25
AN960-10L	88044	3-1	38
AN960E10	88044	3-1	42
AN961-616	88044	3-1	40
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MS16626-1098	96906	3-1	16
MS16995-25	96906	3-1	10
MS20995C32	96906	MSUP	
MS21045-3	96906	3-1	24
MS21083B6	96906	3-1	39
MS21318-13	96906	3-1	2
MS21318-13	96906	3-1	4
MS24694S5	96906	3-1	34
MS24694S53	96906	3-1	
MS35266-64	96906	3-1	21
MS35338-43	96906	3-1	37
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05-101001	31435	3-1	17
05-322503	31435	3-1	12
05-340201	31435	3-1	8
05-360015	31435	3-1	29
05-374093	31435	3-1	27
05-631122	31435	3-1	31
06-109978	31435	3-1	3
07-111259	31435	3-1	22
07-111337	31435	3-1	18
23014-1039	31435	3-1	32
23033-1122	31435	3-1	28
23047-1052	31435	3-1	19
23064-001	31435	1-1	
23064-1011	31435	3-1	13
23064-1150	31435	3-1	5
23064-1180	31435	3-1	30
23064-1260	31435	3-1	33
23064-1270	31435	3-1	
23064-1280	31435	3-1	
23064-1360	31435	3-1	11
23064-1370	31435	3-1	20
23064-1380	31435	3-1	9
23064-1410	31435	3-1	35
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30059-1040	31435	3-1	14
30300-1282	31435	3-1	7
31228-1095	31435	3-1	15

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

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